3 Layer MAPS + ideal TPC Testing

What can the TPC simulations do right now?
What are the main limitations?

Memory use is a problem: ~9 GB without calorimeters causes cache and swap performance problems. No condor use, jobs will be held. Tried highmem queue yesterday, but jobs wouldn't release. Limited workaround => use rcas2601 in the background.

Memory appears to be a limited problem in the TPC clustering, very large arrays are used. We've already reduced the r-segmentation from 60 layers to 45. A more intelligent approach is needed to the clustering.

Single particle sims can be run on rcas2601 without too much sluggishness, other nodes less so, but central Au+Au wasn't workable. I think this is due to random access on the large memory allocation and not some other fundamental issue.

So I embedded into a pseudorapidity slice and reconstructed only around this narrow region at mid-rapidity. This works on rcas2601, but not on condor since the cluster allocation is independent of multiplicity.

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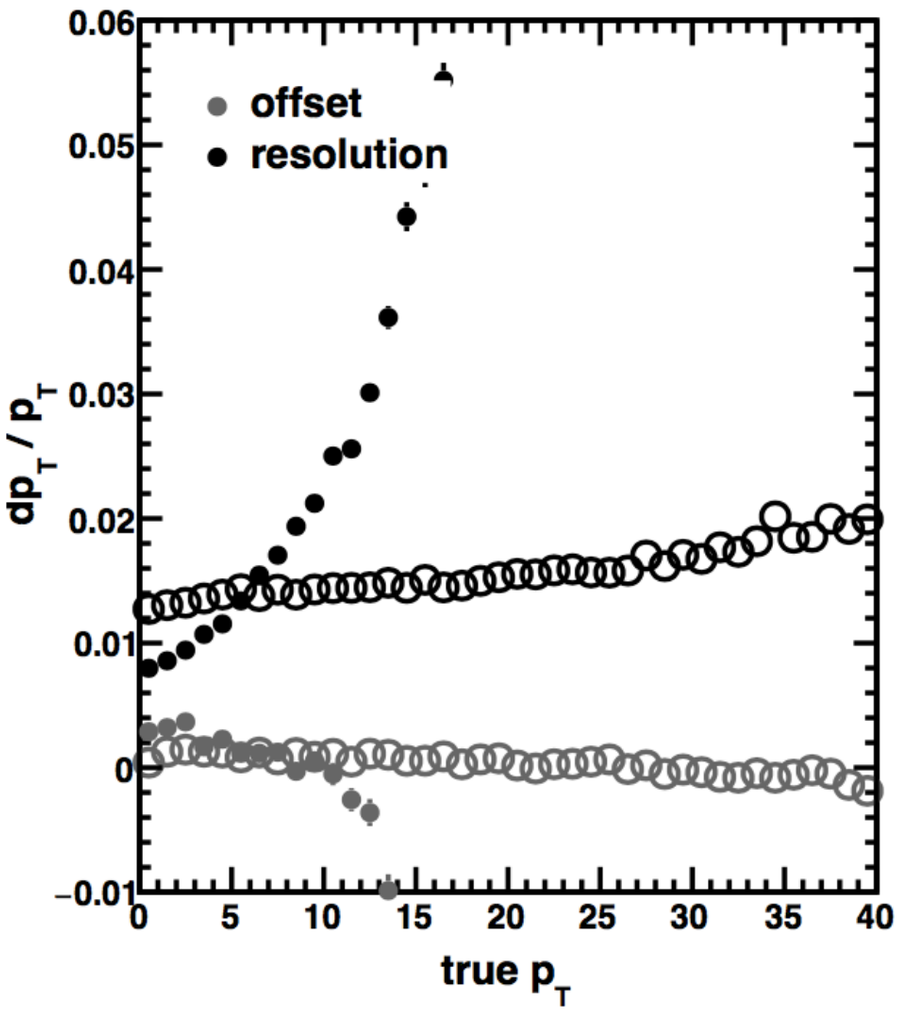
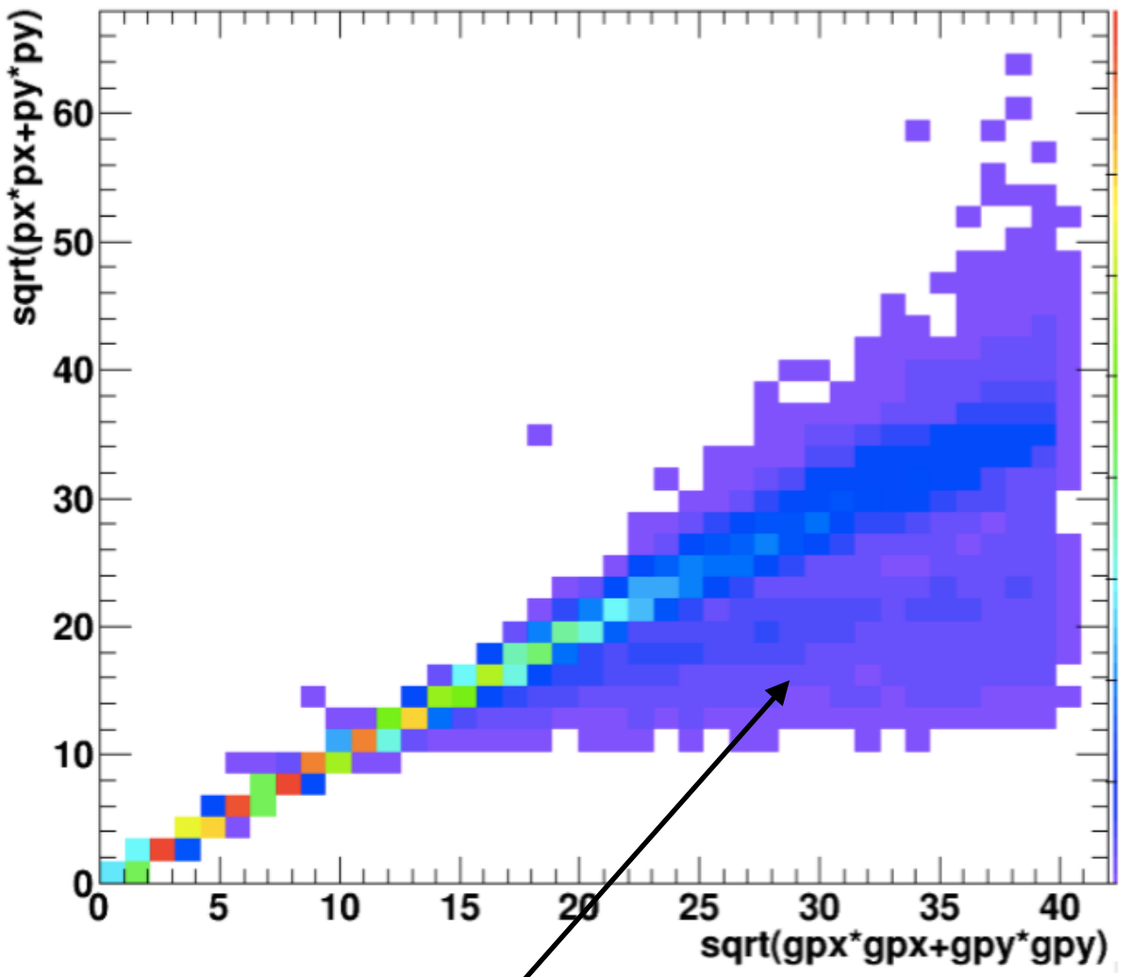
How well are single particles reconstructed?

There is a problem in the momentum reconstruction.





Second population of badly fit tracks

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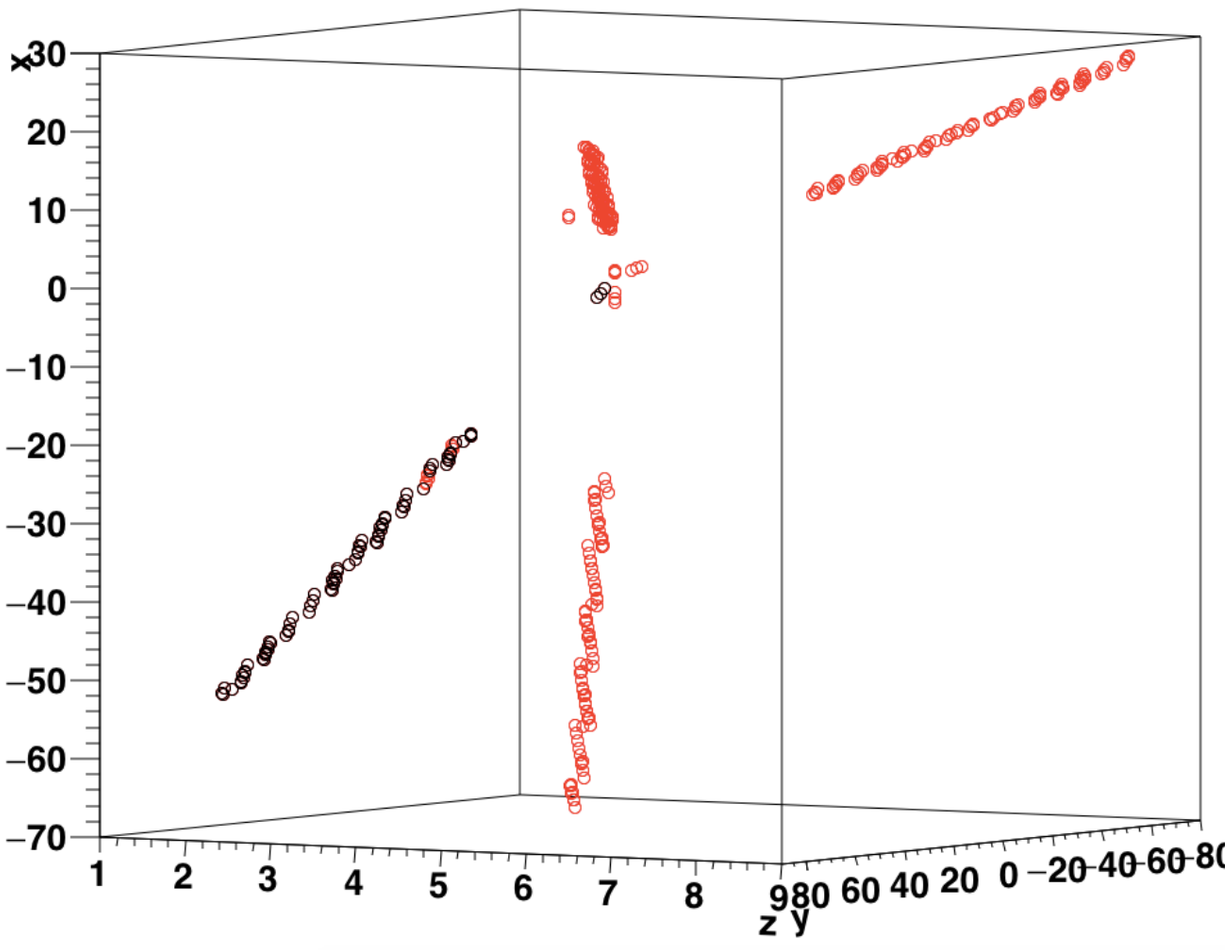
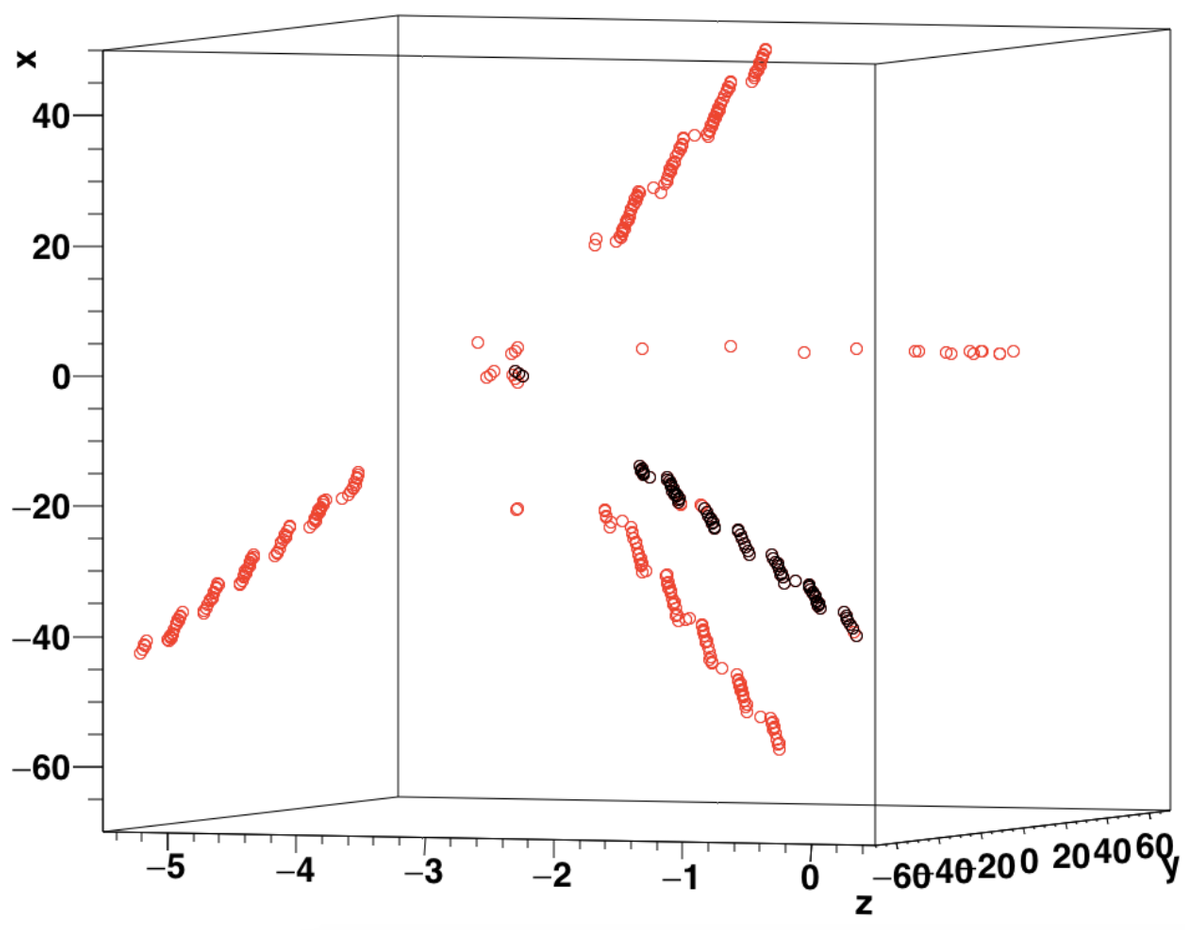
How well are single particles reconstructed?

I started inspecting some makeshift event displays to dig deeper…





Black points = clusters left by truth particle leading to a bad fit
Red points = clusters left by other particles

Charge sharing in z-direction, not functioning correctly (jagged cluster distributions)

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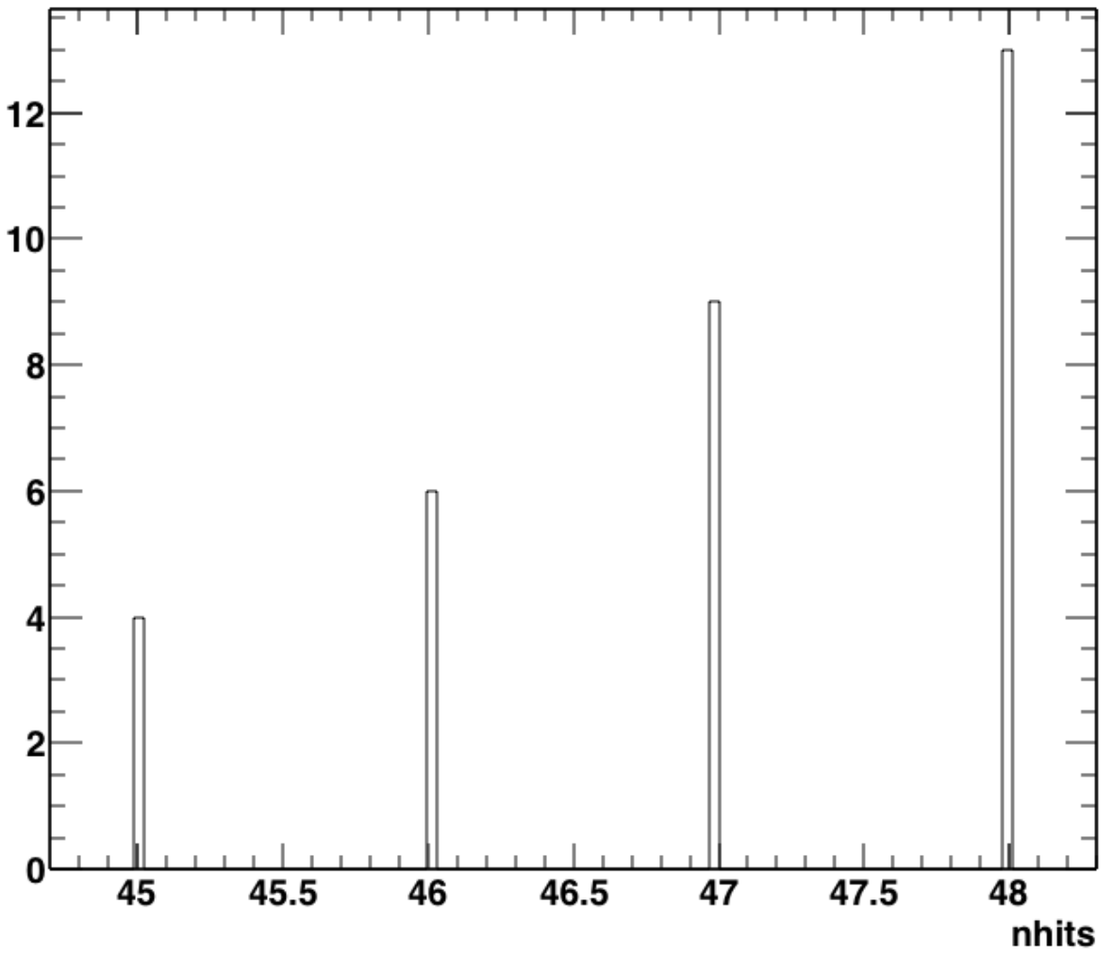
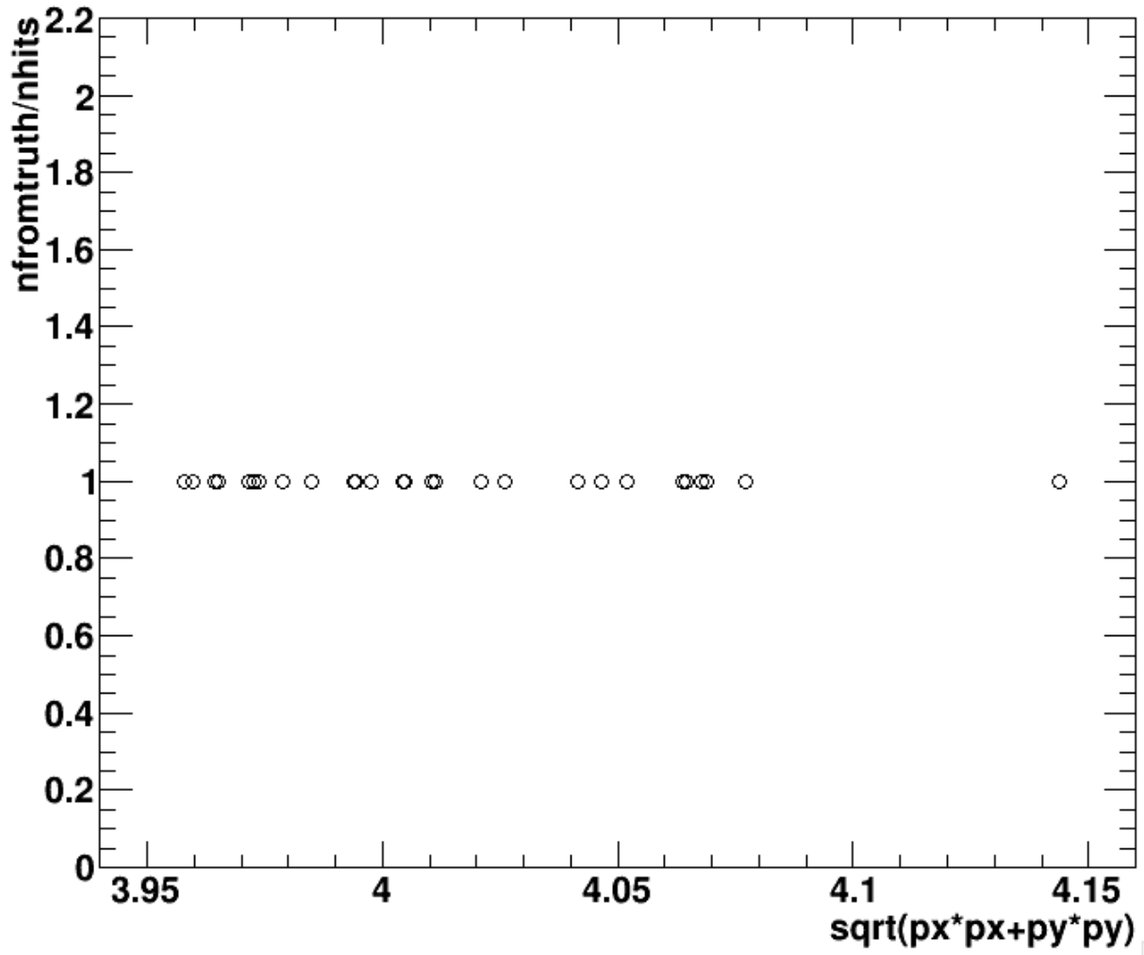
Do we need an intermediate tracking layer?

NB: No Pileup, No Space-Charge Distortions

Embed 4 GeV/c pions at mid-rapidity reco just a narrow event slice around the track.
Ask for tracks with >45 hits (to ensure some hits in the MAPS & TPC)





For embedded particles at 4.0 GeV/c and no non-ideal tracking features, the matching works most of the time.

I make no comment on efficiency for the matching due to the keyhole approach.

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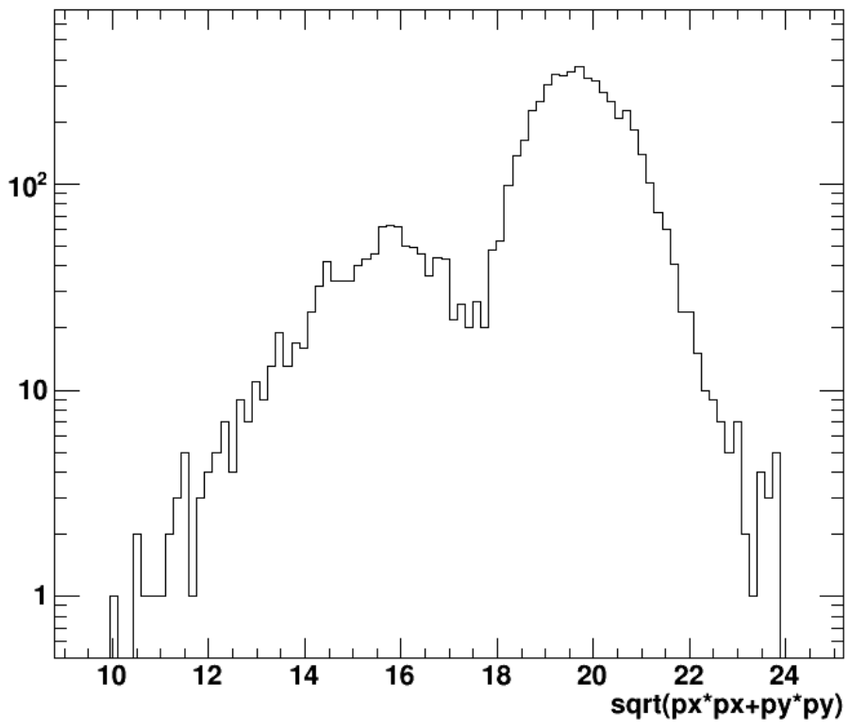
What can we do next?

(1) I can run more statistics of the eta-slice reconstruction. On-going.

(2) Alan will post some pull-requests for the charge sharing and other problems. I need to sort through those and test them. I'll can work on those when they appear

(3) Try out my own clustering algorithm on the TPC. I have energy weighting as an option, just no cap on the cluster-size.

TpcClustering
6 GB memory



SvtxClustering w/ energy weights
<300 MB memory